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ABSTRACT

On the assumption that word frequency in written language as well as children's knowledge of words can provide the basis for a systematic contextual approach to reading vocabulary development, six current reading series and their workbooks (grades two through six) were analyzed for their presentation of prefixed words in context. Results of the study revealed that sufficient opportunities for systematic vocabulary development did not exist at many grade levels in the series for the following reasons: there was a general lack of coordination between what was suggested for teaching in the teacher's guides and what was offered in corresponding reading selections; textbook writers and consultants misunderstood what prefixation is in the English language; and there was an over-reliance on the principle of frequency or on the literary selections in determining the vocabulary used in the text. It was concluded that a generalization from the findings on prefixed words justifies the development of a new rationale for determining vocabulary in reading texts. (MAI)

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TOWARD REASSESSMENT OF THE PRINCIPLES UNDERLYING CHOICE OF VOCABULARY AND READING SELECTIONS IN DEVELOPMENTAL READING PROGRAMS FOR THE ELEMENTARY SCHOOL

Sandra Stotsky

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND USERS OF THE ERIC SYSTEM."

Preface

Prefixes constitute only a small portion of the English lexicon and, at first glance, may not appear to warrant a great deal of attention. However, as a result of an investigation (to be discussed below) designed to revitalize interest in the teaching of vocabulary and to conceptualize a new approach to developing children's reading vocabulary, it became clear that the definition of a prefix lies at the heart of a controversial issue concerning the criteria for determining an English morpheme. Furthermore, an exploration of the phenomenon of prefixation raised new questions about the historical development of the English language and suggested another possible distinction between oral and written language. For example, when and why did certain meanings in English become encoded as prefixes, i.e., as dependent morphemes attached to independent morphemes? Why these meanings and not others? Has literacy training had any influence on the development and use of prefixes in English? Is there any historical relationship between the use of a writing system and the development and nature of prefixed elements in a language? The following pages will describe the research into the teaching and use of prefixes in reading instructional material that led not only to these questions but also to many others concerning the choice and nature of the written material used for reading instruction.

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1.1 Introduction

The research literature consistently indicates that children's knowledge of word meanings is a major factor in reading comprehension. The research evidence also suggests that systematic teaching of vocabulary is better than no attention at all. As Petty, Herold, and Stoll point out: "it is possible to note accumulating evidence to dispel the widely held notion that having students "read, read, read" is a satisfactory method for teaching vocabulary" (1968, p. 84). But the major task confronting the English or reading teacher is not only how to help students expand their knowledge of words but also what vocabulary to teach them in a written language containing the richest lexicon in the world (Potter, 1976, p. 175). Sherwin (1969, p. 37) conjures up the image of a spelling teacher staring at Webster's Third New International Dictionary and praying softly, "Which words, O Lord, which words?" The prayer may be even more appropriate on the lips of a vocabulary teacher.

Unfortunately, despite the overwhelming importance of vocabulary knowledge in all areas of the curriculum, there has been almost no research in the teaching of vocabulary in well over a decade. The investigation to be reported in this article was designed to reawaken research interest in this topic by showing that it was possible to formulate a reasonable rationale for teaching vocabulary that would not only guide the choice of vocabulary to be taught but also incorporate the notion that, in general, vocabulary is best learned in written (and experiential) context. More specifically,

its major purpose was to show how specific theoretical principles and criteria for choosing vocabulary could be integrated and supported by empirical data on word frequencies in written language and children's knowledge of words to provide the basis for a systematic contextual approach to developing children's reading vocabulary. One category of lexical elements - prefixes - was selected to illustrate how these theoretical principles could be applied to the redesign of reading instructional material.

To justify the potential application of this theoretical framework to children's reading instructional material, a content analysis of six current reading series and their accompanying workbooks (grades two through six) was undertaken to determine whether or not sufficient opportunities for systematic learning of the meaning of prefixed words in context were already provided. The results of this survey, described in sections 1.3 to 1.5, led to the conclusion that consideration of a new approach to selecting vocabulary could be justified if one could generalize from the findings on prefixed words. Section 2.1 describes the formulation of this new rationale as it could be applied to the teaching and use of prefixed words in a developmental reading program.

Section 3 discusses the implications of the findings of this investigation for future research. While the initial focus of this study was on the use of prefixed words in instructional material from a pedagogical perspective, an examination of the data as a whole suggests that the use of prefixed words in written language may serve as an index of maturing

linguistic competence in schoolchildren and of conceptual difficulty in reading material. Further, preliminary reflection about the organic relationship between the nature of the reading selection chosen for instructional material and the type of vocabulary used in that selection suggests the importance of critically examining the rationale guiding the choice of reading selections in reading instructional programs.

1.2 Background to the Study

The principal hypothesis of this study - that it was possible to develop a useful and theoretically sound rationale for introducing vocabulary systematically in reading instructional material - was motivated by a consideration of the following research findings, observations, and theoretical issues.

The importance of vocabulary in reading comprehension has been consistently reported in different areas of reading research. Chall (1958) found in a critical review of readability formulas that a measure of vocabulary load was the major factor in almost all readability formulas. Studies of children's language development show a high correlation between pre-schoolers' knowledge of word meanings and achievement in reading at higher grade levels (e.g., Loban, 1970). Factor analyses of component skills in reading comprehension point to a knowledge of words as the essential component in reading comprehension (e.g., Davis, 1971). Further, a summary of research findings from studies in the teaching of vocabulary (Petty, Herold, & Stoll, 1968) indicates that some systematic attention to vocabulary teaching is better than no attention at all. Neverthe-

less, it is difficult to find more than a handful of studies within the past decade concerned with the teaching of vocabulary (Dale, Razik, & Petty, 1973), in contrast to the large numbers published in previous decades. In the most recent annual summaries of investigations in reading (Weintraub et al., 1974-1975; 1975-1976; 1976-1977), only one study is cited (Tuinman & Brady, 1974) that focuses on the teaching of vocabulary.

An examination of the way in which new words are introduced in reading series for the elementary grades (Harris & Jacobson, 1973-1974) indicated that vocabulary seems to be introduced primarily on the basis of frequency of use in written material. An inspection of several current reading series (listed below) suggested that vocabulary is also determined by idiosyncratic usage in literary selections. When literary selections were adapted, there appeared to be no indication of the principles followed in the choice of words. In beginning reading programs, it is highly rational to teach children to read words that are in their oral vocabulary and that are among the most frequent words in written material as well. However, it was felt that too much reliance on the principle of frequency beyond the decoding stages or on exposure to a richer (and possibly uncontrolled) variety of words in literary selections might not be sound from a long-range point of view if it precluded the possibility for systematic development of words unknown to the child, i.e., a reading vocabulary.

One technique that would permit systematic expansion of children's knowledge of unknown words is the grouping of cognates --words which are derived ultimately from a common base or root. For example, the words anthropology, misanthropy, anthropomorphic, and anthropocentric all contain the common element anthropo, meaning "man." As Dale, O'Rourke and Bamman (1971) point out (pp. 4-5), the root graph is used in many English words; yet the familiarity scores of a number of cognates derived from graph would suggest that students are not transferring the meaning of this root at any one point in their vocabulary development, possibly because either the meaning of the root has not been taught, or, if it has, attention has not been drawn to the many cognates derived from this root, or, if attention has been drawn, opportunities for consolidating transfer of knowledge of this root have not been systematically offered in reading instructional material. Table 1, adapted from p. 5 of Dale et al. (1971), illustrates the variation students display in their familiarity with the meaning of cognates derived from the element graph. The Word Recognition Score (from Dale & Eichholz, 1960) indicates the students' familiarity with the meaning of the word (a score of 67% or above was judged to mean that the word is "known" on the average at that grade level); the column under H-J indicates the grade level placement of the word suggested by the Harris-Jacobson (1972) list; the column under T-L indicates the frequency per million in the Thorndike-Lorge (1944) list (words below number 10 are recommended

for levels above grade 6); the column under C indicates estimated frequency per million in the Carroll et al. (1971) list.[1]

From the perspective of the Thorndike-Lorge list, one can easily see why the use of the principle of frequency has militated against the grouping of cognates in reading instructional material. Despite this list, one can also see that, according to the Harris-Jacobson list, a number of these cognates are being taught in the most widely-used elementary reading series, but at different grade levels. If some grouping of cognates could be meaningfully structured into reading instructional material at a proper level, it might be possible to provide for more systematic vocabulary development.

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Table 1 to be inserted about here

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Thus, use of the principle of frequency in the construction of reading material would not seem to help the student learn cognates easily. However, it was our hypothesis that systematic introduction and use of selected meaning-bearing elements could justifiably be considered in designing reading instructional material. The next section will present theoretical principles to support this hypothesis and theoretical criteria to guide its implementation.

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[1]The Harris and Jacobson list is derived from the total vocabulary used in 14 widely-used elementary texts, grades 1 to 6, in reading and other content areas; the Thorndike-Lorge list is derived from the total vocabulary used in very large selections of general reading material, primarily adult; the Carroll et al. list is derived from the vocabulary used in sample passages taken from school texts in all curriculum areas, grades 3 to 9.

1.3 The Problem

One of the first studies in many years to suggest a systematic approach to vocabulary development is O'Rourke's (1974) Toward a Science of Vocabulary Development. His study proposed the application of an operational principle involving the planned use of what O'Rourke terms the "classification-concept" of vocabulary and language development (p. 63). This means that students need to see words as "related, classified components of a synergistic whole." A natural consequence of the classification-concept approach to vocabulary development involves the "principle of transfer" in learning (p. 65). According to O'Rourke, the principle of transfer involves making meaningful associations. This would imply that verbal material should be organized to provide for maximal associational learning. Moreover, a planned program of vocabulary development requires that the "student proceed from the known to the unknown" (p. 64). Thus, systematic vocabulary development could probably be considerably enhanced by the explicit teaching and use of words that permit maximal transfer of semantic knowledge from taught words to untaught words.

Within his classification-concept approach to systematic vocabulary development, O'Rourke divided the kinds of clues students may use in comprehending word meaning into two categories, external clues and internal clues (p.66). The external clues consist of different kinds of context clues, such as definition by apposition or definition by synonym or antonym. In addition to these clues, O'Rourke proposed that students should be taught to look for internal

clues, i.e., the meanings of prefixes, roots, and suffixes. He suggested that teaching roots and affixes "early and regularly" will help to fix the meaning, make the root available for transfer to more difficult words, and improve spelling (p. 98). Thus, the nucleus of O'Rourke's planned program of vocabulary development consists of the study and use of generative roots and affixes. This program would foster the systematic expansion of children's knowledge of words by enabling students to transfer the meaning of an element learned in one word to other words containing that element.

To help decide which elements should be taught first, O'Rourke proposed several criteria. First, he suggested that word elements that have "high visibility" should be presented first. Roots and affixes that are highly "inferable" (i.e., easy to perceive) should precede those that are less highly inferable. As an example, he offers the root cap, which students could learn in such words as capture, captive, captivate, or captious long before they are taught its variants in words such as perceive, receive, or reception. Second, O'Rourke proposed that only those elements that are highly "generative" should be introduced into the system. Thus, for example, suffixes like -less and -ful would be taught early for effective transfer to hundreds of English words, in contrast to a suffix like -dom, a noun-forming suffix with low generative power today (as in freedom and wisdom). Third, O'Rourke suggested that students proceed from known to unknown concepts, learning new words on the basis of words already known. For example, the student would learn reconnect, disconnect,

and misconnect after learning connect. However, O'Rourke did not suggest how these principles and criteria could be integrated into the design of a developmental reading program on a sound empirical basis nor did he investigate whether or not current reading instructional material provides opportunities for expanding children's knowledge of words on this basis.

It was the major purpose of this study to show how the principles and criteria proposed by O'Rourke could be integrated and supported by empirical data to provide a rationale for systematic introduction of vocabulary in reading instructional material. Because it was not possible to deal with all categories of word elements within the scope of one investigation, one category of lexical elements - prefixes - was selected to illustrate how these principles and criteria could be applied to the redesign of reading instructional material. Prefixes were selected for several reasons: (1) they are an often-used and significant category of sementic elements and (2) they are a small enough group of elements to be dealt with comprehensively. However, before formulating this rationale, it was decided that it was necessary first to survey current reading instructional material in order to discover how prefixes are taught at present and what opportunities for systematic vocabulary development with respect to prefixed words now exist. To that end, six current elementary reading series and their accompanying workbooks (grades two through six) were selected for examination. They were surveyed to determine: (1) how prefixes are taught, (2) what prefixes are taught, (3) in what order, (4) at

what grade levels, and (5) how many exemplars of the prefix are offered in meaningful reading material. Findings from this survey would provide data from which to judge whether or not current series are designed to offer sufficient opportunities for systematic expansion of children's knowledge of words containing these meaning-bearing elements and whether or not another rationale could be considered.

1.4 Procedures

The first issue to decide upon was the definition of the term prefix to be used. According to Marchand's (1969) text, which Aronoff (1976) considers the most comprehensive text on the subject of English word-formation, prefixes are defined as "bound morphemes which are preposed to free morphemes" (p. 129). Marchand emphasizes that "only such particles as are prefixed to full English words of general, learned, scientific or technical character can be termed prefixes" (p. 132). For example, hyper- in hypersensitive is a prefix, but hyper- as in hypertrophy is not, as -trophy is not an autonomous English word in the sense required. By definition, then, the elements ad- in adjacent, ex- in expect, post- in postpone, pre- in prefer, com- in companion, ob- in obstacle, de- in determine, etc. are not prefixes in these words because they are not preposed to independent or base words. They are etymological elements attached to roots in non-composite words (i.e., words that cannot be analyzed on the basis of English word-formation). Indeed, such elements as com-, ob-, and ad- are never prefixes.

Second, the following six reading series were selected for the survey:

(1) Allyn & Bacon Basic Reading Series (1968)
(2) Macmillan Reading Program (1970)
(3) Ginn 360 Reading Series (1970)
(4) Scott Foresman Reading Systems (1971-1972)
(5) Holt Basic Reading System (1973)
(6) Ginn 720 Reading Series (1976)

They were chosen because: (1) they are among the most widely-used series in this country; (2) they range in terms of date of publication from the 1960's to the present, thus reflecting differing theoretical issues over the past decade influencing the construction of reading instructional material; and (3) they represent a rough balance between those tending more to use adapted or constructed selections and those tending more to use unadapted literary selections. To judge from the information in the acknowledgment pages at the beginning of the readers, the Allyn & Bacon, Macmillan, and Ginn 360 series appear to contain a rough balance between adapted and unadapted literary selections; the Holt and Scott-Foresman series tend to contain more unadapted selections; and the Ginn 720 series seems to fall between these two groups.

Third, all of the reading material in the pupil readers and workbooks at each grade level in all series was read word by word. For each grade level in each series, tables were constructed containing all exemplars of prefixes taught at that grade level and at previous grade levels. This format was used to show what continuity in providing exemplars is maintained from grade to grade in each series for each prefix once it is introduced or mentioned. The data in

the tables were drawn only from the material in the readers and workbooks which required either meaningful reading or writing of prefixed words; this criterion excluded words listed for purposes of alphabetizing, stress placement, etc. It should be noted that the listing of a word in the tables indicated only appearance, not frequency.

1.5 Findings

Table 2 indicates at what grade level each prefix is first introduced or mentioned in the six series. Only un-, re-, dis-, in-, and im- are introduced in all series by grade 4. Considerable variation in the order of introduction exists for all the other prefixes. It should be noted that many prefixes are not introduced at all. It is not clear from the reading series themselves or from any research literature why these omissions occur or what rationale might provide the basis for the order of introduction of prefixes in general. It is clear only that many common prefixes used in elementary reading material are not taught in all series.

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Insert Table 2 about here

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An inspection of the total number of exemplars for most prefixes in the tables accompanying each series revealed no large differences between the series published earlier (Allyn & Bacon, Macmillan, and Ginn 360) and those published later (Scott-Foresman, Holt, and Ginn 720). However, with the

exception of the Allyn & Bacon series, which tends to have fewer exemplars than all of the other series, there are more exemplars of all prefixes in general in the Macmillan and Ginn 360 series. This indicates that series which have more of a balance between constructed or adapted reading selections and unadapted literary selections seem to provide more exemplars of prefixes than do those series tending more to use unadapted literary selections. Since all prefixes listed in Table 2 are not taught in all series, it was not possible to make an exact overall comparison of the total number of exemplars across series. However, several tables were constructed comparing the total number of all exemplars of four selected prefixes from all series. Table 3 contains all words prefixed by dis- that appear in all the readers for grades four, five, and six; their appearance and total by grade level are indicated within each series. Table 4 contains all words prefixed by in- and im- that appear in all the readers for grades four, five, and six. Table 5 contains all words prefixed by un- in all grade four readers. Note that the Macmillan and Ginn 360 series (together with the Ginn 720 series for in- and im-) provide more different exemplars than the other series. Subject to future research which would take into account the total frequency of appearance of all prefixed words (whether taught as such or not), the data in Tables 3, 4, and 5 suggest that an overemphasis on the use of unadapted literary selections, as in the Scott-Foresman or Holt series, may provide fewer opportunities for

systematic vocabulary development than a more balanced use does - if one may generalize from the findings on prefixed words.

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Insert Tables 3, 4, and 5 here

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An inspection of the tables accompanying each series also revealed a paucity or total absence of exemplars for many prefixes at many grade levels throughout these series. The following reasons were offered to account for this scarcity:

a. There seems to be a lack of coordination between what is suggested for teaching or mentioned in the teachers' guides and what is available in the corresponding reading selections in the readers or workbooks. Sometimes prefixes are mentioned in the introduction of a manual or even indexed in a workbook, but never taught in the guide or exemplified in the entire reader or workbook for that grade level. Quite often prefixes are suggested for teaching in exercises in the guides but only one or two exemplars (if any at all) appear in the reading selections. In general, very few corresponding workbook pages contain an exercise for a prefix suggested for teaching in the guide.

b. There appears to be a misunderstanding of prefixation in all the reading series, according to the definition that was followed in this research. Distinction is usually not made between prefixed words, such as remake, pre-

caution, or defrost, and words with initial etymological elements, such as reflect, prefer, or deliver, which are not susceptible to analysis on the basis of English word-formation. Thus, many words offered as examples of prefixed words are incorrect, misleading, or useless for teaching or learning purposes.[1]

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[1]An exploration into the possible theoretical and philosophical reasons underlying the inaccurate teaching of prefixes in these series would certainly be worthy of investigation, but such an investigation is beyond the scope of this article. An excerpt from Jespersen suggests that the current misconception of prefixation may not have its source in the philosophy and theories of one of the most eminent grammarians of the English language.

> Speaking of word-formation it may not be superfluous here to enter a protest against the practice prevalent in English grammars of treating the formatives of Latin words adopted into English as if they were English formatives. Thus the prefix pre- is given with such examples as precept, prefer, present, and re- with such examples as repeat, resist, redeem, redolent, etc., although the part of the words which remains when we take off the prefix has no existence as such in English (cept, fer, etc.) This shows that all these words (although originally formed with the prefixes prae, re) are in English indivisible "formulas." Note that in such the first syllable is pronounced with the short (i) or (e) vowel (cf. prepare, preparation, repair, reparation), but by the side of such words we have others with the same written beginning, but pronounced in a different way, with long (i), and here we have a genuine English prefix with a signification of its own: presuppose, predetermine, re-enter, re-open. Only this pre- and this re- deserve a place in English grammars; the other words belong to the dictionary. Similar considerations hold good with regard to suffixes; ... (1924, p. 48).

1.6 Conclusions

It was judged that sufficient opportunities for systematic vocabulary development with respect to most prefixes do not exist at many grade levels in these series. When the rationale for choice of vocabulary is stated, choice appears to be governed either by idiosyncratic usage in literary selections or by the principle of frequency or the degree of regularity in sound to symbol correspondence. The analysis of these six reading series suggested that one could justify consideration of another rationale for choice of vocabulary if one could generalize from the findings on prefixed words. Another rationale for choice of vocabulary could be justified if it could provide more opportunities for strengthening and expanding children's knowledge of words than the use of existing principles seems to offer at present. The next section describes the formulation of this rationale.

2.1 Formulation of Another Rationale

In his program for systematic vocabulary development, O'Rourke (1974) proposed several criteria, described in section 1.3, for deciding which elements should be taught first. It was concluded that these critieria could be applied to the teaching of prefixes because: (1) prefixes are relatively unknown morphemes attached to base words which are usually already known (e.g., pre-season), (2) prefixes usually have only one or two invariant meanings, (3) the meaning of a prefix can usually be added literally to the meaning of the base word (e.g., pre-war), (4) prefixes are by definition active or productive elements which are used with countless words, and (5) most prefixes

have invariant graphic forms. Thus, it would be easier for students to learn the meaning of prefixed words (e.g. subsoil) before learning, on the basis of derivation, the meaning of words containing an initial etymological element (e.g., support).

The next thrust of this investigation was to show how the systematic teaching of prefixes and the use of prefixed words could be integrated into the design of a developmental reading program on a sound empirical basis. The principle of frequency is a rational principle (students should to some extent always be learning the most frequent words used in written language). Thus, it was necessary to show how empirical data could support modification of the principle of frequency so that opportunities for greater transfer of meaning could be structured into reading instructional material.

The first set of empirical data that was used appears in Table 6.

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Insert Table 6 about here

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In this table are listed alphabetically on the left 48 prefixed words as exemplars of 8 prefixes. These specific prefixes were chosen because they range from some of the prefixes most frequently taught in the 6 series to some of those least frequently taught. The specific words were chosen because they all appear at least once in elementary school textbooks according to Carroll, Davies, & Richman (1971). The table indicates, first, for each of these prefixed words, the frequency per grade level in Carroll et al. For example, counteract appeared once in grade five. Under the columns RO-PW and RO-BW are

numbers which indicate the rank order (RO) in the Carroll et al. list of the prefixed word as printed (PW) and the base word as printed (BW). For example, counteract has the number 24800-24900 beside it, which means the prefixed word is within the 24800 to 24900 most frequent words in their total sample. The number under BW indicates the rank of the base word as printed in that prefixed word. The numbers under the columns HJ-PW and HJ-BW are the average grade level placement of the prefixed word (PW) and the base word (BW) from Harris & Jacobson (1972).

An inspection of these data revealed several interesting facts about prefixes and prefixed words in general. First, all of these prefixed words have a rank order listing that is higher, i.e., they are less frequent, than the rank order listing for the base word. Second, almost all of the base words are well within the 5000 most frequent words, regardless of the frequency of the prefixed word. Third, within each group of words prefixed by the same prefix, the variation in terms of the difference between the rank order listing of the prefixed word and that of its base word is enormous. For

example, fortune is within the 4000 most frequent words, misfortune within the 10,000 most frequent words; leading is within the 1700 most frequent words, but misleading within the 14,000 most frequent words. The great variation in the difference between the frequency in written language of similarly prefixed words and the frequency of their bases exists for all prefixes.

It was concluded from these data that all the prefixes in Table 2 could be taught after grade three as there are base words within the most common words of our language available for prefixation by all these prefixes. Once the child is taught the meaning of a prefix as one new lexical item, he can literally add its meaning to a number of words within his reading vocabulary, if not within his oral vocabulary as well. Thus, selected exemplars of all these prefixes can legitimately be used in reading selections throughout the middle grades (the basis for selection will be discussed later).

Despite their generally high rank order listing, it should be pointed out that prefixed words are really not very difficult words. They are less frequent and more difficult than their bases, but their

meanings are not as difficult as non-composite words with similar frequencies. For example, superstars falls within the 54,200 to 54,300 frequency rank; so does sundry, subsidize, and teleology. The reason for their relative ease in comprehension is the fact that they contain both an initial element whose meaning is fairly stable and a common word which retains its literal meaning when prefixed. The infrequency of prefixed words in word frequency lists is probably due to the fact that many prefixes can be attached to an extraordinarily large number of base words and they are optional linguistic devices for expressing meaning. For example, instead of a transoceanic voyage, one can write a voyage across the ocean. Thus, there seems to be no valid reason for the great disparity that exists, when one is constructing a reading vocabulary, between the grade level placement of the base word as indicated in Table 6 and the grade level placement of the prefixed word. However, there are valid reasons for some disparity among exemplars of a specific prefix as well as between different prefixes. This issue will be more fully discussed later.

The second set of empirical data that was used to support modification of the principle of frequency came from children's written production of prefixed words in meaningful sentences. In Table 7 are listed a number of exemplars of several different prefixes from the Rinsland (1945) list, based on writing samples from 1 per cent of elementary schoolchildren in this country. Beside each word is a number indicating its frequency of occurrence at each grade level from one to eight. These data reveal several interesting facts: 1) children in the primary grades clearly use prefixed words, and 2) children are capable of using a number of different prefixes in the primary grades.

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Insert Table 7 about here

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It was concluded from these data that if children from the primary grades on are capable of using a large number of different prefixes, depending upon their need for a particular word in a specific piece of writing, then it would seem reasonable to suggest not only that prefixed words in general may not be difficult for children to learn, but also that there may not be a specific order for the intro-

duction and teaching of many prefixes. In other words, it would seem that the use of a particular prefix is more a function of the availability (knowledge) of the base word and the need for the use of the prefixed word than it is of a clear order of difficulty for all prefixes. If children by the fourth grade level are capable of using many differently prefixed words in their free writing, then it would be reasonable to conclude that a large number of prefixes could justifiably be taught at or by that grade level as part of their reading vocabulary.

Evidence was gathered on a related issue. Do children learn the meanings of prefixed words they read as discrete lexical items or as words consisting of known base words qualified by a dependent semantic element? In Table 8 are listed a number of prefixed words tested by Dale-Eichholz (1960), none of which appears in Carroll et al. (1971) before grade 4, and none of which is listed at all in Harris & Jacobson (1972). The high familiarity scores for these words by the fourth grade[s] they tested suggested that children's knowledge of these less frequent words (in both oral and written language) may

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Insert Table 8 about here
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reflect more a general understanding of the function and meaning of the initial element rather than the discrete acquisition of the whole word.

The empirical data from all these sources strongly suggested that on psychological and linguistic grounds all prefixes in Table 2 could be taught after grade three. All have some base words within the most common words of our language and most middle elementary schoolchildren are developmentally ready to understand the concepts or meanings expressed by all these prefixes. However, there appear to be two major types of constraints on the use of specific prefixes or specific prefixed words in middle-grade reading material. The first constraint relates to the natural context in which the prefixed word is apt to be used. Many prefixes, such as anti- or post-, are usually found in conceptually advanced reading material (e.g., antitoxin or postgraduate). It is not so much the inherent difficulty difficulty of these prefixed words that would confine their use to higher grade levels as it is the conceptual difficulty of the natural context in which the word is apt to be embedded. Thus, the use of

of a particular prefixed word, as well as the wide use of exemplars of certain specific prefixes, is governed to a great extent by the nature of the context. This fact thus imposes certain limitations on the use of certain exemplars of prefixes and of exemplars of specific prefixes in general. It does not preclude the use of most prefixes in the middle grades; it simply means that the deliberate use of exemplars of many prefixes for the purposes of systematic vocabulary development in middle-grade reading selections must be guided by the use of developmentally appropriate subject matter.

The second constraint relates to the general nature of the base words to which many prefixes are typically attached. There are a number of prefixes which combine with a large number of very common words in our language. These are the prefixes un-, dis-, re-, mis-, mid-, en-, and fore-. There are historical reasons for this phenomenon; all of these prefixes date back to Old English, Middle English, or early French influence. They have been used for centuries with native Anglo-Saxon words or French words adopted into our language at an early date; these words are our most basic words. It is not surprising, then, that these prefixes tend to be the most frequent

prefixes in vocabulary lists containing prefixed words. (The data in the tables for each series corroborate this statement.) On these grounds, all of these prefixes can justifiably be introduced and taught by the fourth grade. However, some of the other prefixes, particularly in- and its variants, are attached primarily to base words derived from Latin or Greek roots -- hence they are more learned words. Moreover, most native prefixes can also be attached to learned words as well.

These facts have significant implications for general vocabulary sequencing in reading instructional material. If knowledge of the base word is a prerequisite for understanding the prefixed word, and if many prefixes tend to be used with a learned vocabulary, then it behooves designers of reading series to ensure the increasing use of such learned words in reading selections, where they can be taught if they are not part of the child's oral vocabulary. The tendency in some of the most recent series (e.g., Scott-Foresman and Ginn 720) to use unadapted literary selections which contain a great deal of dialogue between children (or even adults) may raise difficulties if

there is excessive use of such selections.[1] The speaking vocabulary used by most children and adults in casual conversation is not typically a learned vocabulary. Literate base words will not occur in dialogue passages as often as they occur in third person narrative passages reflecting the natural language of mature and skilled writers. If students do not have sufficient opportunities to learn literate base words in their reading material, they will not easily learn many prefixed words. Thus, the use of many prefixed words at higher grade levels hinges upon the prior introduction and use of a literate vocabulary.

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[1]The application of a readability formula (such as the Dale-Chall formula) to such reading selections may produce misleading results. The vocabulary factor in the Dale-Chall formula is based on the number of different words outside a given list of easy words. The formula is not constructed to distinguish certain kinds of "different" words (slang, jargon, ethnic, regional, or dialect vocabulary) from other kinds of "different" words (learned or difficult words). Two reading selections in a grade four reader may have a fourth grade readability level, but one may have enriching words in it, the other, "interesting" words. Which type of vocabulary should be emphasized in a developmental reading program? The question deserves much consideration.

2.2 Summary

In conclusion, this section suggested how the principles and criteria proposed by O'Rourke for a program of systematic vocabulary study could be integrated into the design of a developmental reading program on a sound empirical basis. Only a rough ordering for the teaching and use of prefixes can be recommended or justified. The constraints that might apply to specific exemplars of prefixes do not preclude the meaningful use of some exemplars of every prefix by the upper elementary grades. At that level, it is possible to find or create appropriate content in which exemplars of all prefixes can be meaningfully embedded. Furthermore, a careful coordination within each series is necessary to ensure that once exemplars are found in unadapted literary selections in a reader or are used in constructed or adapted selections, there are systematic opportunities at that grade level, in accompanying workbooks, and at succeeding grade levels for students to transfer meanings of prefixes learned in one selection to other exemplars in other selections.

3. Implications for Further Research

An inspection of the total number of prefixed words, grade level

after grade level in the tables accompanying each series of readers, indicated that as reading material increased in grade level or difficulty, the number of prefixed words increased regularly and dramatically be grade six. The major implication of this phenomenon -- a pattern of general increase -- is that frequency of prefixation may serve as one index of conceptual or reading difficulty because it is an index of lexical maturity. How could this be so?

From an inspection of the Rinsland (1945) data, it was apparent that children's production of prefixed words is generally low in comparison to their use of base words, and it remains low throughout most of the elementary school years. Table 9 illustrates this point. It contains the first 13 pairs of prefixed words and their bases that could be found. The pattern is striking and informative. The appearance of a base word almost always precedes the appearance of the prefixed word. Moreover, regardless of when the base word appears, the prefixed word tends to appear, either absolutely or with greater frequency, towards the end of the elementary school years. Two issues

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Insert Table 9 about here

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can be approached on the basis of these data. First, they strongly support the statement that prefixes are usually attached to base words that are already known. Thus, availability of the base word is generally a necessary condition for using the prefixed word. However, it is not a sufficient condition. While children seem to understand the meaning of many prefixed words at an early age, their use of these words in writing in the early grades remains low and sporadic. A dramatic general increase in the use of prefixes tends to occur during the later elementary school years -- a period that coincides with the transition from Piaget's postulated stage of concrete operations to the stage of formal operations. It seems unlikely that this sudden increase could be accounted for by chiefly pedagogical or curricular influences. Thus, the data in Table 9 also suggest the influence of a developmental factor.

It is not difficult to see why frequent prefixation seems to coincide with intellectual maturation as one reflects upon the psychological process underlying prefixation. Prefixation involves the mental capacity to think ahead in order to prepose a qualifying

semantic element to the main semantic element. It is not unlike the preposing of a subordinate clause to the main clause it modifies -- a process to which prefixation may be formally analogous. The frequent preposing of many kinds of dependent clauses to a main clause is also a characteristic of intellectual maturation (Cole, 1924).

Another way of describing prefixation is similar to the way Hunt (1965, 1970) characterized syntactic maturation in writing. He concluded from his examination of writing samples from students in grades 4, 6, 8, 10, and 12 and from adults that syntactic growth was achieved by increasing the number of non-clause optional elements within one of the T-Unit clauses; as writers matured, they consolidated sentences to less than a predicate or less than a clause.[1] Prefixation too is optional; it consolidates the meaning of two or more simpler lexemes into one more structurally complex word with

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[1]For example, according to Hunt (1970), a young child might write: "Aluminum is a metal and is abundant. It has many uses and it comes from bauxite. Bauxite is an ore and bauxite looks like clay." A mature student might write: "Aluminum is an abundant metal with many uses. It comes from an ore called bauxite that looks like clay."

exactly the same meaning. Thus, the production of a more complex lexeme by consolidating the meaning of several simpler semantic units may be analogous to the formation of more complex sentence structures by the transformation and consolidation of simpler grammatical structures.

If the use of prefixed words is optional, does their increasing use have any greater significance other than providing variety? Again, a reflection about the purpose served by the availability of more complex syntactic options is informative. While the increasing use of more complex syntactic structures reflects an underlying maturing intellectual capacity, the deliberate use of complex structures enables writers or speakers to produce individual sentences containing a greater number of ideas. In other words, larger chunks of information can be presented at one point in time or space. Prefixation tends to accomplish the same goal within the framework of one lexical unit. This is probably one reason why the increase in average word length goes hand in hand with an increase in reading difficulty; prefixed words are always longer than each of the individual words that express the same meaning. (It is of course not the

only reason; non-composite words with several etymological elements tend to be multisyllabic, too.)

A concomitant of this fact is that prefixed words tend to be literate words. This may be so despite the paradoxical fact that the native Anglo-Saxon or French-derived prefixes are so often attached to basic (not learned) words in our language, and the others can be, too. The paradox may be explained by the fact that the process of writing gives the mature writer the time necessary for revising and rethinking his verbalized thoughts so that he can consolidate his ideas into a more compact form. The "planning ahead" in prefixation is more difficult in spontaneous oral speech; it can be deliberately structured into written speech during revision, if not before. Thus, more frequent use of prefixation, regardless of the nature of the base word, may be more characteristic of written than oral language, and may thereby be a characteristic of literacy. This is a testable hypothesis.

If frequent prefixation is one reflection of mental maturity

during the process of writing, then one could hypothesize that it could serve as one index of lexical maturation and, accordingly, conceptual difficulty in written language. Since the data in the tables accompanying the reading series are derived from reading materials that extend up only to the sixth grade level, one area of future exploration could be an extension of this aspect of my research into secondary and adult reading materials in order to test the validity of this hypothesized index. It would also be interesting to discover whether different modes of writing (narrative, expository, or descriptive) or different content areas can be differentiated and in what way. If frequency of prefixation is a valid index of lexical maturity and reading difficulty, one would also have to determine how large a corpus of reading material would be needed to establish reliability.

Another area for investigation might be a replication of the structure and procedures of this research for the teaching and use of suffixes. It may be possible to generalize the use of the rationale formulated for the introduction and use of prefixed words to

suffixed words. However, one would first have to survey several reading series to see how and what suffixes are already taught. Such a study might well include material for grades seven and eight. A related area of research might be an adapted replication of the procedures of this research to discover for teaching purposes a selected number of often-used roots in non-composite words whose initial etymological element is related to a prefix that has already been taught.

Another possibility for research that could have direct curricular application would be the development of a "word-combining" program to enhance students' lexical skills similar to the sentence-combining programs that have already been developed to enhance students' syntactic skills in writing (see 1975, for a description of some of these programs, and Strong, 1976, for more detailed discussion and a list of available materials).

A major area for speculation and exploration, and it deserves much consideration, is the whole question of what kinds of reading selections should constitute reading instructional material. Should

there be a balance between adapted or constructed selections and unadapted ones? Do unadapted literary selections provide sufficient opportunities for developing all reading skills? Are exposure to literary language and the motivational element of a tale well-told adequate reasons for their inclusion in a developmental reading program? What is changed when a literary selection is adapted? Should adapted literary selections be used at all in a developmental reading program? If literary selections are to be used, what kind of vocabulary should one seek before a story is selected? How often should informational selections be used? Do expository informational selections provide better material for teaching all reading skills than narrative literary selections? Could they incorporate more of the vocabulary of the content areas than they now do? These are such fundamental questions that one wonders why there appears to be so little published research on these matters in all the professional journals and texts that deal with the teaching of reading or the teaching of English.

References

Aronoff, Mark. Word formation in generative grammar. Linguistic Inquiry Monographs. MIT Press, 1976.

Chall, Jeanne. Readability: an appraisal of research and application. Columbus, Ohio: Ohio State University Press, 1958.

Carroll, J., Davies, P., & Richman, B. The American heritage word frequency book. Boston: Houghton Mifflin Co., 1971.

Cole, L. The psychology of elementary school subjects. New York: Farrar & Rinehart, 1924.

Dale, E., & Eichholz, G. Children's knowledge of words. Columbus, Ohio: Bureau of Educational Research and Service, Ohio State University, 1960.

Dale, E., O'Rourke, J., & Bamman, H. Techniques of teaching vocabulary. Palo Alto, Cal.: Field Educational Publications, 1971.

Dale, E., Razik, T , & Petty, W. Bibliography of vocabulary studies. (3rd revised edition) Columbus, Ohio: Ohio State University Press, 1973.

Davis, F. Psychometric research on comprehension in reading. In F.B. Davis (Ed.), The literature of research in reading with emphasis on models. East Brunswick, N.J.: Iris Corp., 1971.

Greenberg, J. Essays in linguistics. Phoenix Books, Chicago: University of Chicago Press, 1963.

Harris, A., & Jacobson, M. Basic elementary reading vocabularies. New York: Macmillan, 1972.

Harris, A., & Jacobson, M. Some comparisons between the basic elementary reading vocabularies and other word lists. Reading Research Quarterly, 1973-1974, 9 (1), 87-109.

Hunt, K. Grammatical structures written at three grade levels. (Research Report No. 3) Urbana, Ill.: National Council of Teachers of English, 1965.

Hunt, K. Syntactic maturity in schoolchildren and adults. Monographs of the Society for Research in Child Development, 1970, Serial No. 134, 35, 3.

Jespersen, O. The philosophy of grammar. New York: W.W. Norton, 1965. First published in 1924.

Loban, W. Stages, velocity, and prediction of language development: kindergarten through grade twelve. (Final Report) Washington: Office of Education, Bureau of Research, U.S. Department of HEW, 1970.

Marchand, H. The categories and types of present-day English word-formation. (2nd revised edition) Munich: C.H Beck, 1969.

O'Hare, F Sentence-combining: improving student writing without formal grammar instruction. (Research Report No. 15) Urbana,Ill: National Council of Teachers of English, 1973.

O'Rourke, J. Toward a science of vocabulary development. The Hague: Mouton Press, 1974.

Petty, W., Herold, C., & Stoll, E. The state of knowledge about the teaching of vocabulary. Champaign, Ill.: National Council of Teachers of English, 1968.

Potter, S. Our language. Middlesex, England: Penguin Books, 1976.

Rinsland, H. A basic vocabulary of elementary school children. Macmillan, 1945.

Sherwin, J.S. Four problems in teaching English: a critique of research. Scranton, Pennsylvania: International Textbook Co., 1969.

[redacted]. Sentence-combining as a curricular activity: its effect on written language development and reading comprehension. Research in the Teaching of English, 1975, 9 (1), 30-71.

Strong, W. Sentence combining: back to the basics -- and beyond. English Journal, 1976, 65 (2), 56, 60-64.

Thorndike, E.L., & Lorge, I. The teacher's word book of 30,000 words. New York: Columbia Unitversity, Teachers College Press, Teachers College, 1944.

Tuinman, J., & Brady, M. How does vocabulary account for variance on reading comprehension tests? A preliminary instructional analysis. In Phil L. Nacke (Ed.) Interaction: research and practice for college-adult reading. Twenty-third Yearbook of the National Reading Conference, 1974.

Weintraub, S., et al. Summary of investigations related to reading, July 1, 1973, to June 30, 1974. Reading Research Quarterly, 1974-1975, 10, 3.

Weintraub, S., et al. Summary of investigations related to reading, July 1, 1974, to June 30, 1975. Reading Research Quarterly, 1975-1976, 11, 3.

Weintraub, S., et al. Summary of investigations related to reading. July 1, 1975, to June 30, 1976. Reading Research Quarterly, 1976-1977, 12, 3.

Reading Series

Centennial Edition of the Sheldon Basic Reading Series. William D. Sheldon et al. Allyn & Bacon, Inc., 1968.

Holt Basic Reading System. E. Evertts, L.C. Hunt, & B. Weiss. Holt, Rinehart & Winston, Inc., 1973.

Macmillan Reading Program, Revised Edition. A.J. Harris et al. Macmillan Co., 1970.

Reading 360. T. Clymer, D. Gates et al. Ginn & Co., 1970.

Reading 720. T. Clymer et al. Ginn & Co., 1976.

Scott Foresman Reading Systems. I.E. Aaron et al. Scott, Foresman & Co., 1971.

TABLE 1

A COMPARISON OF CHILDREN'S WORD KNOWLEDGE OF COGNATES DERIVED FROM GRAPH IN DALE AND EICHHOLZ TOGETHER WITH THEIR HARRIS-JACOBSON GRADE LEVEL PLACEMENT AND FREQUENCY PER MILLION IN THE THORNDIKE-LORGE AND CARROLL ET AL. LISTS

Word	Word Recognition by Percent				H-J	T-L	C
	Grade 6	Grade 8	Grade 10	Grade 12			
photograph	88				6	35	11.6
photographer	88				6	3	2.4
paragraph	89				4	12	73.2
autograph	87				5	2	1.4
biography	61	90			5	5	3.3
telegraph	94				4	29	13.5
phonograph	92				4	6	5.8
graph		92			4	-	32.9
graphic				51	-	3	.5
graphite			73		5-6	4	1.2
stenographer		66			-	6	.5
bibliography			70		-	1	.3
autobiography	89				5	3	.9

TABLE 2

GRADE LEVEL AT WHICH PREFIX IS FIRST INTRODUCED OR MENTIONED IN THE SIX READING SERIES*

Series	A&B	H	G 360	S-F	H	G 720
anti-	4	5		5	5	6
circum-			6		5	
co-		6		6	6	
counter-	4				5	6
de-			2		2	2
dis-	3	3	4	3	2	3
em-	6	6				
en-	4	5	4	4	2	4
extra-					6	
fore-		5	5	5	3	5
il-		6		4	5	
im-	3	3	4	4	4	4
in-	3	3	4	4	3	4
ir-		6		4	5	
inter-	5	6		6	6	6
intra-					6	6
mid-		5		5	3	
mis-	4	5		4	3	
non-	4	6	4	4	3	4
post-			6	6	5	6
pre-	4	5	3	4	4	2
pro-	4	6	5		4	5
re-	3	3	2	3	3	3
semi-	6				6	
sub-	4	5	4	6	2	5
super-		3		5	4	5
trans-	5	6		6	5	5
un-	3	2	3	2	2	3

*This list includes almost all elements termed prefixes by the six series that could be taught as prefixes, whether or not they were taught accurately. Excluded are all the number word parts, the prefixes a- (as in ablaze) and be-, the elements tele-, auto-, micro-, and bio-, and a group of prefixes that are more appropriately taught at the secondary school level: a- (meaning not), ab-, ante-, contra-, ex-, hyper-, meta-, per-, peri-, and pseudo-.

TABLE 3

APPEARANCE OF WORDS PREFIXED BY DIS- BY GRADE LEVEL
IN THE GRADES 4, 5, AND 6 READERS
IN THE SIX READING SERIES

Series	A&B			M			G 360			S-F			H			G 720		
Grade	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
disable		X						X									X	
disadvantage		X	X			X		X	X		X			X	X			X
disagree	X	X	X	X	X	X	X		X	X	X		X	X	X	X	X	
disappear	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
disapprove			X	X	X	X		X				X			X		X	
disarm	X														X			
disbelieve					X	X			X	X		X	X		X			X
discharge		X				X		X				X			X			
disclose												X						
discolor								X	X						X		X	X
discomfort						X								X				
disconnect						X						X						
discontent			X			X												
discontinue						X												
discourage		X	X		X	X	X			X	X	X	X	X	X			
discredit															X			
disembody									X									
disengage												X						X
disgrace			X	X	X	X		X							X			
dishearten									X						X			X
dishonest					X	X			X			X			X			
disillusion									X									X
disinherit								X									X	
disintegrate									X							X		X
disinterest						X									X			
dislike				X	X	X	X	X	X				X		X		X	
dislocate									X									X
dislodge			X			X			X						X			X
disloyal			X															
dismast						X												
dismount	X				X	X	X		X		X			X	X			X
disobey				X		X	X		X	X				X	X		X	X
disorder		X			X	X			X		X	X						X
displace									X									
displease	X				X	X		X										
disprove						X		X									X	
disregard						X						X						
disremember					X													
disrepair						X												
disreputable												X						
disrespect							X											
distaste															X			
distrust		X					X	X				X			X		X	
Total Number	5	9	9	6	12	26	8	12	17	5	7	12	5	7	20	3	10	13

TABLE 4

WORDS PREFIXED BY IM- AND IN- IN THE GRADES 4, 5, AND 6 READERS IN THE SIX READING SERIES

Series	A&B			M			G 360			S-F			H			G 720		
Grade	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
immemorial									X									X
immobilize								X									X	
immoral												X						
immortal		X						X	X			X					X	X
immovable			X			X									X			
impassable		X	X		X			X	X		X						X	X
impassive												X			X			
impatient	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
imperfect															X			
impenetrable			X			X												
impersonal												X			X			
impertinent												X						
imperturbable			X															
implacable											X							
impolite				X														
impossible	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
impractical									X									X
improbable									X									X
improper				X														
impure		X																X
inability				X														
inaccurate						X												
inappropriate				X														
inattentive																	X	X
inaudible															X			
incapable									X					X				X
incompatible		X				X												
incompetent			X									X				X		
incomplete				X														
inconvenient				X				X				X					X	
incorrect				X	X					X								
incredible		X	X			X		X	X			X	X		X		X	X
incredulous			X			X			X			X			X		X	
incurable				X														
indecision															X		X	
infinite						X						X					X	
independent			X		X	X		X	X	X		X		X	X	X	X	X
indescribable												X						X
indifferent																	X	
indignity																		X
indirect				X	X	X	X											
ineffectual									X									
inexpensive		X										X	X					
inexperience					X		X		X				X			X		X
inexplicable			X															
inevitable								X										
inglorious					X						X							
inhospitable															X			
inhuman												X						
injustice						X												
innumerable						X												
insane						X	X		X			X			X	X		X
insensitive				X														
insignificant						X			X									X
intolerance						X												
invincible																		X
invisible			X		X	X		X	X	X	X	X	X		X		X	X
involuntary												X						
Total Number	2	8	12	0	15	17	5	10	16	5	6	19	5	4	14	6	14	19

TABLE 5

WORDS PREFIXED BY UN- IN THE GRADE 4 READERS
IN THE SIX READING SERIES

Series	A&B	M	G360	S-F	H	G720
unable		X			X	X
unaccented		X				
unaware	X					
unbarred						X
unbelievable			X		X	
unbound		X				
unbraided		X	X			
unbroken		X				X
unbuckle			X		X	
uncertain		X	X	X	X	X
uncomfortable	X		X	X		X
unconcerned					X	
uncooked						X
uncover			X			X
uncrowded					X	
undisturbed		X				X
undo					X	
undoubted			X			
unearth		X	X			
uneasy	X	X	X	X	X	X
uneducated		X				
unending			X			
uneven		X	X	X	X	X
uneventful					X	
unexpected		X		X	X	X
unfair		X			X	
unfamiliar		X	X		X	X
unfit			X			X
unfold	X	X		X	X	
unforgettable			X			
unforgotten	X					
unfortunate			X	X	X	
unfriendly		X			X	
unfurl					X	
unguarded	X					
unhappy	X	X	X	X	X	X
unharness	X					
unhitch			X			
unhurried			X			
unhurt	X					
unimportant		X				
unimpressed					X	
uninjured			X			
uninteresting	X					
unjust		X				
unknown	X	X	X			X
unlatch					X	X
unlicensed		X				
unlike	X	X	X	X	X	
unload	X	X	X	X	X	
unlock		X	X	X		X
unlucky		X	X		X	
unmake						X
unmapped		X				
unmistakable					X	
unmoved						X
unnecessary		X		X		
unnerve					X	
unnoticed		X				
unpack		X			X	
unpleasant		X	X			
unplug					X	
unpopular			X			X
unprepared		X				
unravel					X	
unreasonable						X
unrewarded					X	
unroll	X		X	X		
unruffled	X					
unsafe				X		
unscrew	X					
unseat		X				
unseen	X	X				X
unselfish		X				
unsolved		X				
unsteady					X	
unsung		X				
unswerving			X			
untamed		X				
untangle			X			
untidy						X
untie	X	X	X	X		
untold			X			
untouched			X			X
untrained		X				
untrick			X			X
untroubled					X	
untwist			X			
unused				X		
unusual	X	X	X	X	X	X
unwanted		X		X		
unwary			X			
unwind				X		X
unwilling	X	X			X	
unwise		X				
unworthy	X		X			
unwrap	X		X			X
unwritten	X	X				
unzipper					X	
Total Number	23	46	36	19	34	24

TABLE 6

RANK ORDER FREQUENCY RANGE FROM CARROLL, DAVIES, AND RICHMAN (1971) OF SELECTED PREFIXED WORDS AND THEIR BASES AND THEIR GRADE LEVEL PLACEMENT IN HARRIS AND JACOBSON (1972)

	Grade Level							
	3	4	5	6	RD-FW	RD-BW	HJ-FW	HJ-BW
counteract	0	0	1	1	24800-24900	1000-1100	--	2
counterattack	0	1	0	0	29900-30000	1700-1800	--	3
counterbalance	0	0	0	1	32200-32300	1700-1800	--	4
counterclockwise	1	0	4	0	10700-10800	10200-10300	6	6
countermelody	1	0	0	1	53500-53600	4500-4600	--	5
counterpart	1	0	0	0	21800-21900	100-200	--	2
counterpoint	0	0	6	0	24900-25000	200-300	--	2
disagree	4	0	3	6	8700-8800	1700-1800	6	3
disappear	12	19	7	14	4400-4500	1100-1200	3	3
discontent	3	0	2	0	14200-14300	3200-3300	6	3
discourage	2	2	1	4	12100-12200	2000-2100	5	3
disliked	4	4	4	1	10400-10500	800-900	3	1
disorder	1	4	0	5	13200-13300	300-400	4	3
forecasts	5	2	5	5	12200-12300	10000-10100	6	4
forefathers	1	4	2	1	11000-11100	4400-4500	--	1
forefeet	2	1	1	2	20800-20900	200-300	--	1
forefinger	1	2	?	2	10200-10300	1200-1300	--	2
forehead	10	22	13	13	3800-3900	200-300	4	1
foreman	7	2	4	4	5800-5900	100-200	5	1
mid-air	1	0	0	3	16600-16700	100-200	--	2
midday	3	1	3	8	9300-9400	100-200	6	1
midnight	10	25	25	19	3100-3200	200-300	5	1
midsummer	2	2	1	1	12800-12900	400-500	--	2
midway	3	2	0	4	10300-10400	0-100	5	1
misfortune	3	0	2	6	9900-10000	3800-3900	6	3
misleading	0	1	0	0	14100-14200	1600-1700	--	3
misplaced	0	1	1	0	27500-27600	700-800	6	2
misspelled	24	36	32	33	6600-6700	1900-2000	6	4
misunderstanding	0	0	2	1	11900-12000	1500-1600	--	3
misuse	1	0	1	0	19500-19600	0-100	--	2
precaution	0	0	1	0	18600-18700	6900-7000	6	6
predetermined	0	1	0	0	24400-24500	2100-2200	--	5
preflight	4	0	0	0	44400-44500	1400-1500	--	4
prehistoric	3	1	6	7	5800-5900	5200-5300	5	5
pre-season	0	0	0	1	54000-54100	1200-1300	--	3
preview	0	0	1	0	12800-12900	1500-1600	--	3
subcontinent	0	0	1	7	22000-22100	2000-2100	--	5
subdivisions	0	3	0	2	12300-12400	3800-3900	--	6
subheadings	0	3	4	0	20100-20200	5000-5100	--	4
subsoil	0	1	1	0	26900-27000	700-800	--	4
subtopics	0	2	4	6	15300-15400	2100-2200	--	5
subway	10	3	5	1	7100-7200	0-100	5	1
superhighway	7	15	0	1	12700-12800	2200-2300	--	4
superimposed	0	0	2	1	22300-22400	9900-10000	--	--
supermarket	9	3	3	3	8800-8900	1200-1300	6	3
supernatural	0	0	2	3	13000-13100	600-700	6	4
superstars	0	1	0	0	54200-54300	700-800	--	3
superstructure	1	0	0	0	43900-44000	1400-1500	--	4

TABLE 7

FREQUENCY OF APPEARANCE BY GRADE LEVEL OF SELECTED PREFIXED WORDS FROM THE ELMSLAND (1945) DATA

Grade Level	1	2	3	4	5	6	7	8
disagreeable	1	-	-	-	2	-	6	6
disappear	-	1	1	1	2	1	8	13
disappeared	2	2	4	11	12	8	20	96
discouraged	-	-	2	1	4	1	17	8
disobey	-	-	5	2	2	-	2	1
disobeyed	1	-	1	-	2	4	2	4
forefathers	-	-	-	2	2	2	7	9
forehead	1	1	1	2	16	4	5	18
foreman	-	-	2	-	1	4	8	6
forearm	-	1	-	1	7	13	2	1
impatient	-	-	22	1	1	4	36	7
impolite	-	-	21	-	2	2	-	2
impure	-	-	5	-	1	4	5	2
incorrect	-	-	5	-	-	-	-	50
midnight	-	-	10	15	18	11	26	53
midsummer	-	1	-	-	2	-	1	4
mid-term	-	-	-	2	2	-	5	-
midway	-	-	5	-	1	22	2	1
misfortune	-	-	1	-	-	-	2	2
mispronounce	-	-	2	-	-	7	-	-
mispronounced	-	-	6	-	-	-	-	1
misspelled	-	-	1	2	7	2	-	-
misunderstand	-	-	2	-	-	20	-	2
misunderstood	-	-	6	-	-	4	-	2
unbroken	-	-	-	2	1	2	4	-
unbutton	14	-	11	-	-	-	-	-
uncertain	-	-	2	-	6	-	2	1
uncomfortable	-	-	2	1	4	7	7	10
unconscious	-	-	1	2	-	6	12	22
uncovered	1	2	1	2	1	4	2	9
undone	2	-	-	-	1	2	-	-
undress	-	-	4	1	1	1	2	2
unfriendly	-	-	2	2	-	-	2	4
unhappy	-	2	8	20	15	26	18	24
unknown	-	1	2	8	8	104	16	22
unloaded	2	-	6	2	4	20	8	14
unlock	1	-	6	2	1	2	2	4
unlocked	4	-	1	4	1	2	8	12
unlucky	-	-	1	2	8	-	2	14
unpleasant	-	-	1	2	4	2	2	12
until	-	21	22	47	2	10	1	2
untied	-	-	2	2	2	4	7	6
unusual	1	1	2	2	7	2	16	21
unwrapped	2	-	2	7	6	-	1	6

TABLE 8

FAMILIARITY SCORES OF FOURTH GRADERS FOR SELECTED PREFIXED WORDS FROM DALE-EICHHOLZ (1960)*

Words	Scores
disloyal	73%
dismount	70%
misbehave	86%
misconduct	67%
misplace	76%
unafraid	77%
unbalanced	76%
unburned	84%
unexplored	71%
unheard	88%
uninvited	89%
unmarried	80%
unnatural	88%
unprepared	84%
unquestioned	86%
unsatisfied	93%
unwritten	89%

*Word with scores of 67% or more are considered "known" on the average at this grade level.

TABLE 9

FREQUENCY OF APPEARANCE BY GRADE LEVEL OF SELECTED PAIRS OF BASE WORDS AND PREFIXED WORDS FROM THE RINSLAND (1945) DATA AND THEIR GRADE LEVEL PLACEMENT IN HARRIS AND JACOBSON (1972)

Grade	1	2	3	4	5	6	7	8	H-J
equal	-	-	-	7	26	13	17	23	4
unequal	-	-	-	-	-	-	-	3	6
employed	-	-	-	-	-	1	-	8	5
unemployed	-	-	-	-	-	-	-	4	-
fortunate	-	-	-	-	2	3	49	17	4
unfortunate	-	-	1	1	-	1	6	22	6
important	8	4	14	53	85	143	311	428	3
unimportant	-	-	-	-	-	-	1	20	6
inhabited	-	-	-	-	-	1	4	21	5
uninhabited	-	-	-	-	-	-	-	3	-
injured	-	-	16	1	11	21	14	27	5
uninjured	-	-	1	-	-	-	-	4	-
direct	-	-	-	1	-	12	9	16	3
indirect	-	-	-	-	-	-	1	9	5
formal	-	2	-	-	6	7	-	9	5
informal	-	-	-	-	1	-	-	9	5
regular	11	1	7	9	19	34	49	49	4
irregular	-	-	-	-	-	5	2	5	6
force	-	-	-	10	8	8	29	62	3
enforce	-	-	-	-	-	46	4	17	5
forced	-	-	-	-	5	9	44	76	3
enforced	-	-	-	-	-	1	-	12	5
understand	10	3	26	12	21	48	53	72	3
misunderstand	-	-	3	-	-	10	-	3	-
understood	-	1	4	4	2	29	17	19	3
misunderstood	-	-	6	-	-	4	-	3	-